SPRG Style Recommendations for CDF Publications

This note addresses stylistic problems that are common in CDF paper drafts. If you can eliminate these problems, it will make it easier for your CDF colleagues to review your draft and for the PRL editors to publish it. We strongly encourage authors to review both the APS and AIP Style Guides (see **APS authors' help**) for technical advice. For English basics try *The Elements of Style* by Strunk and White. If in doubt, use the experimental method: look at recent PRL or PRD publications to see how specific stylistic issues are handled.

Editorial policies are journal specific- APS rules for PRL and PRD, Elsevier for NIM and PL. Here we deal specifically with APS rules. Some of our recommendations are redundant with proper use of RevTex4. Note that style guides like the *Chicago Manual of Style* can be helpful, but their recommendations do not always match APS requirements. The main principles in AIP/APS style are those for "formal scientific writing", where the need to achieve clarity and avoid ambiguity is paramount.

Length requirements apply to PRL and PRD-RC, as given on the APS web page. For PRL, the length recipe can be found at **PRL Length Guide**.

This note merges the recommendations of the Cathy Newman-Holmes (CNH) Guide with additional frequent nits found by the SPRG. It includes appendices on how to define CDF variables, PRD-specific formatting, and general punctuation recommendations.

I. General remarks adapted from the CNH Guide

A good scientific paper explains not only what was done but why it was done. The introduction should explain why the physics is interesting, what is the current state of experimental knowledge, and how our result improves that knowledge. The conclusion should discuss the implications of the new result for theory or other types of measurements. Avoid weak conclusions of the type "with more data in the future we will get a better answer". Avoid belaboring the claim "if our measurement disagrees with SM expectations, then that could be a sign of new physics"- unless you present explicit tests of new physics models.

Cut values should be motivated, not just stated. The values may be the result of an optimization procedure just for this result or may have been chosen for a broad class of analyses. Explain in the paper or quote a reference.

The majority of CDF papers are sent to PRL. This journal, unlike Physics Letters B, is special in that the Letters are supposed to be of interest to the physics community, including condensed matter, nuclear, gravitation, etc. The editors have reserved a "printer's mark" stamp for submissions that live up to this lofty goal. This places a premium on logic and clarity and avoidance of jargon.

II. Abstract

The AIP Style Guide has lots to say about abstracts. The abstract must be a standalone document. It should contain the main numerical results. It cannot have references or refer to items in the main paper. Many people will read only the abstract, so make it count. In addition, AIP tells us not to use "We" in the abstract but instead use either passive voice or "The authors"; "We" with active voice is fine in the rest of the text. The length should not be more than 500 words; in PRL use a maximum of 600 characters including spaces.

III. Figures

1. The figures should be clearly labeled. Make sure the axes are labeled.

2. The numbering of the figures should match the text, and the figures should be numbered in the order in which they occur in the text.

3. The notation for symbols on the figures should match the notation used in the text. This is a common problem.

4. Be careful in use of color; it shows up in the online version but is grayscale in the printed version (unless CDF wants to pay for color).

5. Get rid of "CDF Run II", "3000 pb^{-1}", "preliminary", etc.- labels that are clear from the text.

6. Figure captions begin with, e.g., "FIG. 13. Caption.." with Arabic numerals. When referring to figures in the text, abbreviate "figure" by, e.g., "Fig. 13" except at the beginning of a sentence where it is written out, e.g. "Figure 13".

7. Multipart figures should have labels "a, b, c.." on the subplots, not "top", "left", etc. The subplots should be referenced in the text as, e.g., "Fig. 13(a)".

8. Font sizes must be adequate- see APS Guide.

IV. Tables

The table format is quite specific- see APS Guide and also RevTex4 examples. Table captions begin with, e.g., "TABLE I. Caption..", with Roman numerals. No vertical bars; caption at top followed by double horizontal bars, column labels, single bar, entries, bottom double bar. When referring to tables in the text write, e.g., "Table IV" with Roman numeral.

Tables should be numbered in the order in which they appear in the text. Notation for symbols in tables should match that used in the text.

V. General prose recommendations from CNH Guide

1. Avoid jargon. CDF jargon often creeps into our papers. Some examples: "trigger tower", "LSHR", "cosmics".
   Note that "central" and "forward" should not be used as nouns.
   "Monte Carlo" is a place, not a technique; use "Monte Carlo simulation" or "simulation."
   "Toy Monte Carlo" is jargon; use "simulation."
   The term "fake" is both slang and jargon; use "misidentified" or "false".
   "Pseudoexperiment" (think "pseudointellectual") has a pejorative tone;
   "simulated experiment" generally has the same meaning.
   If you must use "toy", "fake", "pseudo", then define these terms.

2. If you talk about polar or azimuthal angles, be sure to say that the positive z axis is along the proton beam direction. It is usually not necessary to completely specify the CDF coordinate system.

3. Try to avoid introducing too many abbreviations. You don't have to say that the central outer tracker is the COT if you don't refer to it again in the paper.

4. Use standard CDF notation. We are the CDF collaboration. We use the CDF II detector. We do not use the CDF-II detector or the CDF Run II detector.

5. Don't start sentences with symbols or numbers.

6. When a sentence starts with a prepositional, participial, or adverbial phrase, the phrase should be followed by a comma. Examples are, "To reduce background, events with multiple interactions are removed.", "Having reduced background,...", and "When we reduce background,..."

7. Use a comma before the conjunctive in a compound sentence "A did this, and (but, or...) B did that". Do not use the comma in the case of one subject "A did this and that".

8. Don't use adverbs like "however", "thus", and "therefore" as conjunctives. For example, instead of writing "CDF is big, however D0 is bigger," write "CDF is big, but D0 is bigger.", or "CDF is big. However, D0 is bigger."

9. A few more common errors in usage:
   (a) "Calorimeter" vs. "calorimetry" - remember that "calorimeter" is what you build and "calorimetry" is what you do with it. Think of "camera" and "photography" to remember the difference (i.e. you don't say, "I took a picture with my photography.").
   (b) "Calorimeter cluster" - this sounds like a cluster of calorimeters. Use "energy cluster" or "calorimeter energy cluster" instead.

(c) It is common to say "track" when one means "charged particle" or perhaps "muon candidate." Watch out for this. For example, "tracks" don't deposit energy in the calorimeter. Technically, "charged tracks" is incorrect too. Particles have charge; tracks have curvature. Besides, in high energy physics, tracks are not usually associated with neutral particles.

(d) "1000 fb^{-1}" refers to integrated luminosity. Do not say "1000 fb^{-1} of data", but "data corresponding to an integrated luminosity of 1000 fb^{-1} ".

(e) "Error" vs. "uncertainty". We quote uncertainties. If we had known errors, we would fix them.

(f) "Comprise": "The zoo comprises the animals; the animals consititute the zoo."

(g) "Combinatorial backgrounds" (adjective); "background combinatorics" (noun).

10. Restrictive vs. nonrestrictive etc.:
    In general use "that" for restrictive, "which" for nonrestrictive.
    "The black cat that got electrocuted in our detector is being examined by E.S.and H."
    "A black cat, which got lost in B0, put its paws on a high voltage lead."

    Likewise in introducing symbols, use "The cross section σ for wimp production..", but "The cross section for wimp production, σ,..

VI. Further text requirements for APS journals

1. Use American English, not British English spelling. For example, use "parametrize," not "parameterise", "flavor", not "flavour". Check the dictionary if in doubt.

2. If in doubt about APS spelling preferences, try the AIP Guide for common terms such as "parametrize", "cross section", "cross-check".

3. The AIP Guide gives many standard abbreviations, such as "C.L.", "N.B.", "rms", and standard units of measure such as "1.4 T (magnetic field)". Check this resource before inventing your own abbreviations.

4. More abbreviations:
   "Eq. (1)", "Eqs. (3), (4), and (6)", "Eqs. (3)-(6)",
   "Equation (1) at beginning of sentence
   "Fig. 1", "Figs. 1 and 2", "Figs. 4-8".
   "Ref. [3]", or "[3]", "Refs. [5-8]", or "[5-8]".

5. Use math italics for particle symbols:W, π, B_c=W, π, B_c

6. AIP recommends that the draft be read and edited by native English speakers, for example, the literary godparent. Word ordering is part of native vs. non-native English:
"the effects were investigated of varying the kinematic cuts" (non-native)
"the effects of varying the kinematic cuts were investigated" (native)
Both are comprehensible but one is unnatural. Likewise, the ordering of modifiers is different for adjectives and verbs.
"The beautiful data", not *"the data beautiful"*, but
"the data described in this Letter", not *"the described data in this Letter"*.

7. Computer program names are written in "small capitals". An example is
"PYTHIA" produced using "\sc pythia", or "\textsc pythia". The computer code name is all lower case. Be careful- "CTEQ" is a collaboration, not a code name, so use Roman caps.

8. Follow the "Harvard" convention for commas in a list. When there are three or more items, a comma follows the second to last item, e.g. "A, B, and C". The serial comma is sometimes actually needed- consider, for example, "Hits are required from L00, the SVX II and ISL, and the COT." This is especially important in author lists.
N.B.: this serial comma is not generally used in most public media reports; it is an example of "rules for grammar and punctuation (that) have special application to scientific writing" (AIP.III.A).

9. Numbers: see AIP
Use words for "zero, one..ten".
Use numerals for "11, 12, 999...".
But use numerals for "1, 2, 12, and 19" (mixed list).
For five or more digits use spaces, not commas: "12 000", "6 427 020", not "12,000", "6,427,020". This is because the comma serves as decimal point in Euro convention.

10. Capitalization: see AIP
Use "Letter" in reference to a PRL ("in this Letter"); likewise for "Addendum, Comment, Communication, Note" when they refer to a specific section of a journal. Never capitalize "article, paper, report".

11. Capitalize proper nouns (people or places)- "Gaussian", "Higgs". Do not capitalize "standard model" (this is APS preference); "central outer tracker (COT)"; "level 2", "extremely fast tracker".

12. Hyphens: See APS Guide:
Hyphenate a compound adjective before a noun such as "b-quark background".
Don't use a hyphen in the noun "b quark".
Use compound hyphens if it improves clarity, "face-centered-cubic object".
Avoid hyphens that serve no purpose, "misidentified" instead of "mis-identified".
N.B. "pseudorapidity" has no hyphen. Pseudo can be used as an adjective or in closed

form; it is used with a hyphen only with proper nouns, e.g., "pseudo-Gaussian".

13. Math symbols: See APS Guide for naming mathematical symbols.
   Multiletter constructs like "LSHR" are not suitable as symbols in equations.

14. Italics: italics are generally used for foreign words that may be unfamiliar to the reader.
   Italicization of Latin words is not automatic:
   et al., *ibid.*, but
   i.e., A.D., N.B., Q.E.D.

15. Format for measurements: "$XXX \pm YYY$ (stat) $\pm ZZZ$ (syst) ". i.e., Roman for
   "stat" and "syst" with no periods.

VII. Names of collaborations

CDF
D0 (no longer "D\O")
Belle
BABAR=
{\mbox{\sl B\hspace{-0.4em} {\small\sl A}\hspace{-0.37em}\sl B\hspace{-0.4em}}}
{\small\sl A\hspace{-0.02em}R}

VIII. References

1. The references should be numbered in the order in which they appear in the text.

2. Use standard APS journal abbreviations, for example:
   "Nucl. Instrum. Methods **NNN**", or
   "Nucl. Instrum. Methods Phys. Res., Sect. A **NNN**"
   "J. High Energy Phys."

3. Use *et al.* (italics and period).
   N.B.: use *et al.* for four or more authors if there is a length constraint as in PRL.
   N.B. Generic BibTex used with RevTex4 converts "and others" to "et al." in Roman.
   One way to force italics is to use the "@misc" reference format instead of "@Article";
   the RevTex4 helpdesk claims this will be fixed in next generation.

4. Collaboration references:
   "A. Aardvark *et al.* (XXX Collaboration)". Do not use "[XXX Collaboration]".
   N.B. providing the collaboration name in a reference is useful for the reader. In general,
   if we leave it out, APS editors will not fix it. Use collaboration names as given above.

5. Use `\bf` for journal numbers but not letters or pages:
   "Phys. Rev. D **99**, page (year)."
   Exception "Nucl. Phys. **B33**, page (year)."
   Further exception: current APS format for JHEP is:
   "A. Aardvark *et al.*, J. High Energy Phys. 03 (2001) 123."
   (no `\bf` on the volume "03" and note special ordering).

6. Use serial commas in author lists:
   "A. Aardvaark, B. Bozo, and C. Schnapps.."
   However, for two authors: "A. Aardvaark and B. Bozo" (no comma).

7. arXiv references, current APS format:
   "J. Blow *et al.*, arXiv:hep-ex/ijklnm."
   "J. Blow, arXiv:1234.5678v1"
   N.B. No need to provide the title. However, use a published paper rather than a preprint if possible.

8. If a paper has been accepted for publication, use:
   "J. M. Smith, Phys. Rev. D (to be published)".
   "submitted for publication" is not a proper reference, though it may be your placeholder if acceptance is imminent; otherwise, use just the arXiv reference.

9. For PDG use:
   "K. Nakamura *et al.* (Particle Data Group), J. Phys. G **37**, 075021 (2010)."
   This supersedes
   "C. Amsler *et al.*, Phys. Lett. B **667**, 1 (2008)."

10. Theses:
    "A. Aardvark, Ph.D. thesis, Harvard University, 1820."
    N.B. All Fermilab theses have Fermilab Note numbers; you can look these up on the thesis link on CDF Navigator **FNAL Thesis archive**.

Appendix A: CDF Math Notation

The following symbols should always be defined in the text:

1. Transverse momentum (p_T; in TeX use `$p_T$`): Mention that this is the momentum transverse to the beam direction. The symbol p_T is used in e^+e^- papers to mean momentum relative to a jet axis.

2. Transverse energy (E_T; in TeX `$E_T$`): This must be defined since energy is not a vector.

3. Missing transverse energy ($\not{\!\!E}_T$; `${\not\!\!E_T}$`): This must be defined and carefully. CDF papers have frequently used such definitions as "the vector sum of the transverse projections of the energy..." Remember, energy is NOT a vector! Here is a definition of missing E_T:

The missing E_T ($\vec{\not{\!\!E}}_T$) is defined by,

$$\vec{\not{\!\!E}}_T = - \sum_i E_T^i \hat{n}_i, \ i = \text{calorimeter tower number with } |\eta| < 3.6 \qquad (1)$$

where $\hat{n}_i$ is a unit vector perpendicular to the beam axis and pointing at the ith calorimeter tower. We also define $\not{\!\!E}_T = |\vec{\not{\!\!E}}_T|$.

The TeX for this is:

```
The missing $E_T$ ($\not\!\! \vec{E}_T$) is defined by,
\begin{equation}
     \not\!\! \vec{E}_T = - \sum_{i} E_T^i \hat{n}_i,
     ~i = \rm calorimeter~tower~number~with~|\eta| < 3.6
\end{equation}
where $\hat{n}_i$ is a unit vector perpendicular to the beam
axis and pointing at the i$^{th}$ calorimeter tower. We also define
$\not\!\!E_T=|{\not\!\!\vec{E}_T}|$.
```

4. Pseudorapidity: If you use η, mention that it is the pseudorapidity. It is **NOT** necessary to define the pseudorapidity.

5. Transverse mass (m_T; `$m_T$`): This should be defined if it is used.

Of course if you use other special symbols, they should be defined. Note that all "transverse" quantities have a capital T subscript. The reason for the choice of T over t is that T is easier to read.

Appendix B: CDF Detector Description

In addition to the standard CDF detector references that are listed in the CDF Godparent Instructions, some standard CDF numbers for detector resolutions, efficiencies, and journal references are given at Doug Glenzinski's page **PRL CDF Detector Parameters**.

Appendix C: Section and Subsection Headings for PRD

Format for headings are quite specific, and should be handled correctly with proper use of RevTex4. The APS Guide instructions are given below for PRD. When referring to a particular section in the text abbreviate "section" as "Sec." unless it comes at the beginning of the sentence where it is written out as "Section", e.g., "backgrounds are discussed in Sec. II B" . Note: PRL does not have sections.

I. PRINCIPAL HEADING

(Level 1) Centered heading, all capital letters in boldface, preceded by a Roman numeral and a period, followed by paragraph indentation.

A. First subheading

(Level 2) Centered heading in boldface, first word capitalized, preceded by a Roman capital letter and a period, followed by paragraph indentation.

1. Second subheading

(Level 3) Centered heading, first word capitalized, all italic, preceded by an Arabic numeral and a period, followed by paragraph indentation.

(a) Third subheading (Level 4) Text following a paragraph indentation, first word capitalized, all italic, preceded by a lowercase letter or number in parentheses.

Appendix C: More on Use of Commas (Paul Shepard Guide)

Some points on the use of the comma taken from The Elements of Grammar by Margaret Shertzer are quoted below. This partial list of rules should help you to use commas correctly and to avoid superfluous commas. The use of the comma after phrases and clauses at the beginning of a sentence is not an arbitrary requirement.

1. Use a comma after a long introductory prepositional phrase out of its natural order or when punctuation is needed for clearness. For example,

   In regard to the cost of remodeling your home, it is likely to be more economical than buying another house at present interest rates.

   Besides having to buy a car, he needed to find a place to live.

2. Usually short introductory prepositional phrases need not be followed by a comma, except when they are distinctly parenthetical; *for example, in fact, on the other hand.*

   In recent months many changes have taken place in the city.

   During the last twenty years the company's profits have tripled.

3. Use a comma after introductory participial and absolute phrases.

The matter being decided, the President continued his report.

Realizing the need for more storage room, we built a new wing.

4. Use commas to set off nonrestrictive participial phrases. A nonrestrictive participial phrase adds an additional thought and might be omitted without interfering with the meaning.

The letter from the Brooks company, just received by Collins, clarifies the problem.

5. Do not use a comma to set off restrictive participial phrases. A restrictive participial phrase is one that is essential to the meaning of the sentence.

All persons known to have seen the accident will be questioned.

6. Use commas to set off descriptive phrases followed the noun they modify.

The stock, having reached 175, remained there for three weeks.

7. When a dependent adverbial clause precedes a main clause, a comma is generally used.

While the general trend has been upward, decreases in the tax rates are not unknown.

Before the sale is advertised, we must take an inventory of our present stock.

But a short introductory adverbial clause may need no comma after it, if there is no uncertainty where the main clause begins; this is likely to be the case when the subject of both clauses is the same.

If we go back in American history we find this country has never kept silence as to what it stands for.

Before I began to write novels I had forgotten all I learned at school and college.

Note that when the dependent clause follows the main clause, the comma is usually omitted, except when the clause is plainly nonrestrictive, that is, adds a reason or concession introduced by because, since, as, though.

He was always at hand when there was difficult work to do.

He saw that some causes of international jealousy and of war would be removed if the grosser forms of exploitation of labor and the more distressing kinds of competition in this field were eliminated.

Loyalty is one of the cardinal virtues of a secretary, because of the confidential nature of the position.

8. Use a comma between the parts of a short compound sentence when punctuation is needed for clearness or to give an additional idea.

   We have been planning this expansion for years, and I am glad the time has come to make a start.

   But do not use commas to separate the members of a compound sentence when the clauses are short and closely related.

   Fill in the enclosed blank and mail it today.

   However, use a semicolon between the clauses of a compound sentence when the conjunction is omitted or when the connection is not close.

   The Working Girl, long harassed and patronized, has earned her way to linguistic equality; a sign of the changing times is that it is not possible to say that Heaven protects the Career Women.

   The statistical evidence is there; it cannot be denied.

9. Distinguish between a compound sentence (two or more independent clauses) and a simple sentence with a compound predicate (two or more verbs with the same subject). Do not use a comma between the verbs of a compound predicate.

   He joined the firm as an accountant and in time became manager.

   They changed their plans and set up a dummy corporation.